Designation: B570 – 22

Standard Specification for Copper-Beryllium Alloy Forgings and Extrusions (UNS Nos. C17000 and C17200)[1]

This standard is issued under the fixed designation B570; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This specification establishes the requirements for copper-beryllium alloy forgings and extrusions produced from Copper Alloy UNS Nos. C17000 and C17200.

NOTE 1—Requirements for copper-beryllium alloy rod and bar appear in Specification B196/B196M (Section 2).

1.2 Unless otherwise specified, Copper Alloy UNS No. C17200 shall be the alloy furnished whenever Specification B570 is specified without an alloy designation.

1.3 *Units*—The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.4 The following safety hazard caveat pertains only to the test method(s) described in this specification:

1.4.1 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

B194 Specification for Copper-Beryllium Alloy Plate, Sheet, Strip, and Rolled Bar

B196/B196M Specification for Copper-Beryllium Alloy Rod and Bar

B249/B249M Specification for General Requirements for Wrought Copper and Copper-Alloy Rod, Bar, Shapes and Forgings

B601 Classification for Temper Designations for Copper and Copper Alloys—Wrought and Cast

B846 Terminology for Copper and Copper Alloys

E8/E8M Test Methods for Tension Testing of Metallic Materials

E18 Test Methods for Rockwell Hardness of Metallic Materials

E112 Test Methods for Determining Average Grain Size

3. General Requirements

3.1 The following sections of Specification B249/B249M constitute a part of this specification.

3.1.1 Terminology
3.1.2 Materials and Manufacture
3.1.3 Sampling
3.1.4 Number of Tests and Retests
3.1.5 Specimen Preparation
3.1.6 Test Methods
3.1.7 Significance of Numerical Limits
3.1.8 Inspection
3.1.9 Rejection and Rehearing
3.1.10 Certification
3.1.11 Test Report
3.1.12 Packaging and Package Marking

3.2 In addition, when a section with a title identical to that referenced in 3.1, above, appears in this specification, it contains additional requirements that supplement those appearing in Specification B249/B249M.

4. Terminology

4.1 *Definitions:*

4.1.1 For definitions of terms related to copper and copper alloys, refer to Terminology B846.

4.1.2 *forging, n*—a metal part worked to a predetermined shape by one or more such processes as hammering, upsetting, pressing, rolling, and so forth.

[1] This specification is under the jurisdiction of ASTM Committee B05 on Copper and Copper Alloys and is the direct responsibility of Subcommittee B05.02 on Rod, Bar, Wire, Shapes and Forgings.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

***A Summary of Changes section appears at the end of this standard**

5. Ordering Information

5.1 Include the following specified choices when placing orders for products under this specification, as applicable:

5.1.1 ASTM designation and year of issue;

5.1.2 Copper Alloy UNS No. designation;

5.1.3 Temper (Section 8) or condition (Section 12);

5.1.4 Dimensions: thickness, width, length, and edges for flat products; diameter, length, distance between flat surfaces, if any, and edges for all other products. Dimensions may be specified on a drawing;

5.1.5 For extrusions: diameter, length (or mass), and straightness as required;

5.1.6 Dimensional tolerances shall be as agreed upon between the manufacturer or supplier and purchaser;

5.1.7 Quantity—total weight, or total length, or number of pieces of each size.

5.2 The following options are available and, when required, shall be specified at the time of placing the order.

5.2.1 Tension test or hardness (Section 11),

5.2.2 Finish (Section 14),

5.2.3 Grain size (Section 9),

5.2.4 Inspection report,

5.2.5 Test report,

5.2.6 Certification,

5.2.7 Special marking or packaging,

5.2.8 If product is purchased for agencies of the U.S. government, see the general requirements section of Specification B249/B249M for additional requirements, if specified.

6. Material and Manufacture

6.1 *Material:*

6.1.1 The material of manufacture shall be cast or wrought billet of Copper Alloy UNS No. C17000 or C17200 of such purity and soundness as to be suitable for processing into the products prescribed herein.

6.1.2 The product heat number shall appear on the certification or test report.

6.2 *Manufacture:*

6.2.1 The product shall be manufactured by such hot working and heat treating processes as to produce a uniform wrought structure in the finished product.

6.2.2 The product shall be hot worked to the finish size and subsequently heat treated when required, to meet the temper properties specified.

7. Chemical Composition

7.1 The material shall conform to the chemical composition requirements in Table 1 for the copper alloy UNS No. specified in the ordering information.

TABLE 1 Chemical Requirements

Element	Composition, %	
	Copper Alloy UNS No. C17000	Copper Alloy UNS No. C17200
Beryllium	1.60–1.85	1.80–2.00
Additive elements:		
Nickel + cobalt, min	0.20	0.20
Nickel + cobalt + iron, max	0.6	0.6
Aluminum, max	0.20	0.20
Silicon, max	0.20	0.20
Copper	remainder	remainder

7.1.1 Results of analysis on a check sample shall conform to the composition requirements within the permitted analytical variance specified in Table 1.

7.2 These composition limits do not preclude the presence of other elements. By agreement between the manufacturer and purchaser, limits may be established and analysis required for unnamed elements.

7.3 For alloys in which copper is listed as "remainder," copper is the difference between the sum of results of all elements determined and 100 %. When all the elements given in Table 1 are determined, the sum of the results shall be 99.5 % minimum.

8. Temper

8.1 The standard tempers for products described in this specification are as follows:

8.1.1 *M30*—As Hot Extruded.

8.1.2 *TB00*—Solution Heat Treated (A), Table 2.

8.1.3 *TF00*—Precipitation Hardened (AT), Table 3.

8.2 The standard temper designations available under this specification are as prescribed in Classification B601.

9. Grain Size

9.1 The grain size, if required, shall be as agreed upon between the purchaser and the manufacturer and shall be determined in accordance with Test Methods E112.

10. Physical Property Requirements

10.1 *Microstructure:*

10.1.1 The product in the TF00 (precipitation-hardened (AT)) condition shall have a microstructure with a minimum of second phase (beta) constituents. When present, beta shall be fine and well dispersed.

TABLE 2 Mechanical Properties as Solution Heat Treated

Temper Designation		Diameter or Thickness, in. (mm)	Copper Alloy UNS No.			
			C17000	C17200	C17000	C17200
Code	Name		Tensile Strength, ksi (MPa),[A, B] max		Rockwell Hardness, max	
					B Scale	
TB00	solution heat-treated (A)	all sizes	85 (590)	85 (590)	85	85

[A] ksi = 1000 psi.

[B] See Appendix X1.